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3.5
Conduct of Operations for LLNL Facilities

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Recommended for approval by the ES&H Working Group

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New document or new requirements

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3.5

Conduct of Operations for LLNL Facilities*

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* Minor revision

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Conduct of Operations for LLNL Facilities

1.0 Introduction

This document shall be implemented by facility associate directors (ADs), facility managers, program ADs, and their management chains operating in high-hazard facilities (HHF), moderate-hazard facilities (MHF), and low-hazard facilities (LHF). There are no high-hazard facilities at LLNL, nor are there any plans to add any in the future, and therefore, further reference to them have been deleted. However, additional requirements apply to high hazard facilities, and those requirements would have to be returned to this document if such facilities are added in the future. This document provides the guidelines and guidance to satisfy conduct of operations requirements for DOE facilities at LLNL. The implementing guidelines are graded based on the hazard classification of each facility and the impact an operation could have on health, safety, or the environment or on the programmatic mission. This document applies to all facilities classified by LLNL as moderate or low hazard and is to be implemented at the facility level. It does not apply to "General Industrial Hazards" facilities, such as offices or cafeterias. (Contact your directorate assurance manager if you are unsure of a facility's classification.)

This document also does not apply to institutionally provided services—such as environmental monitoring, personnel dosimetry, bioassay monitoring, hazardous waste analysis, and security—or to plant services and equipment—such as low-conductivity water (LCW), potable water, and the electrical distribution system. (However, a facility housing these services shall comply with the document if the facility is classified as a MHF or LHF.)

Each facility at LLNL has a facility AD. This individual has the overall responsibility for ensuring that applicable elements of this document are addressed and the elements that apply to facility safety are implemented. Normally, this responsibility is assigned to a manager or managers, a facility point of contact, or an equivalent person appointed by the facility AD to carry out facility safety functions. This document refers to these individuals collectively as the facility management chain. The need for multiple documents within a facility that houses more than one facility manager or multiple programs should be determined on a case-by-case basis by the facility management chain.

Programmatic activities in each facility are under the purview of a program AD, who may or may not be the same as the facility AD. Each program AD is responsible for designating individuals to implement the elements of this document as they apply to their experimental setups or programmatic activities. Normally, these responsibilities are assigned to program or project leaders or to an equivalent person appointed by the

program AD. This document refers to these individuals collectively as the program management chain.

Any given facility has only one facility AD; however, there may be several programs with different program management chains operating within the facility. Facility ADs (or their designees) are responsible for ensuring that the facility manager is aware of the assigned conduct of operations items. Each facility manager is responsible for ensuring that applicable elements of this document are implemented for facility operations and maintenance. Facility managers are responsible for assuring that people performing programmatic work within the facility comply with facility-specific requirements and that the program management chain has implemented the appropriate elements of this document in their facility.

The program ADs (or designees) are responsible for ensuring that the program management is aware of the items assigned to them and that these items are implemented in an acceptable fashion. (Reference: Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual*.)

Each of the 18 sections of this document addresses a specific topic related to conducting operations. Each chapter contains an introduction, the specific requirements that shall be addressed and implementing guidance for MHFs and LHFs. In many cases, these guidelines are already addressed in existing documents, such as facility safety plans (FSPs), operational safety plans (OSPs), and LLNL's *ES&H Manual*, and compliance has already been achieved. Facility management and program management should take credit for these items whenever appropriate and not rework these issues for the sake of this document. For your convenience, cross references are supplied to documents that have the same or similar requirements. The guidelines contained in this document are not intended to conflict with any other DOE or LLNL document; however, as revisions to this or other referenced documents occur, conflicts may arise. In this case, contact your directorate assurance manager for help.

This document should be used as a workbook to document the compliance status of each facility. After the document is initially filled out, it should be updated as compliance is achieved and as programs, personnel, and facility equipment change. The document should be available for review by auditors.

1.1 Instructions for Use

1. Complete the signature page.
2. Determine which hazard classification has been assigned to the facility; contact your directorate assurance manager or the environmental, safety, and health (ES&H) team leader for your area if you are unsure of the facility's classification.

Implementing guidance is provided for MHFs and LHFs; facilities that are classified as "General Industrial Hazards" facilities are not required to implement this document (but they are required to comply with the ES&H requirements specified in the *ES&H Manual*.).

3. The implementation guidelines in 11 of the 18 sections of this document are related to operations, equipment, systems, or processes that could produce "significant impact to health, safety, or the environment" or "significant impact to programs" (see Appendix A, "Definitions"). Therefore, initial identification of operations that you are responsible for and that fall into these categories will be helpful to you for quickly assessing the applicability of many of the guidelines. Facilities that have completed a Safety Analysis Report will be able to obtain this information from their SAR.

4. Read Part I of each section. These brief statements provide a summary of each conduct of operations topic and are intended to help you determine whether the elements of the section are applicable.

5. Read each guideline in Part II of each section and, based on the corresponding guidance provided in Part III, determine if the item is applicable.

    a. If the item is applicable, write "yes" in the column labeled "Applicable." If the item is considered applicable to all facilities, a "yes" has already been entered.

    b. If the item is not applicable, write "no" in the "Applicable" column and note why it is not applicable in the column labeled "Comment/Reference for Verification of Compliance." For example, (1) a criticality safety program is not applicable in a facility that handles only tritium because tritium cannot under any circumstances produce a criticality accident; (2) the facility may not contain operations that could result in significant impact to health, safety, or the environment or significant impact to programs; or (3) there may be no implementing requirements specified for a particular hazard classification (such as a LHF.)

6. For each applicable item,

    a. Indicate whether responsibility for compliance lies with the facility management (FM) chain, program management chain, or both by circling the appropriate initials in the column labeled "Responsibility for Compliance."

    b. Write "yes" in the column labeled "Compliance" if compliance has already been achieved. For example, if the guideline is to have an organizational chart and one already exists, write "yes" in the Compliance column and use the Comment/Reference for Verification of Compliance column to indicate where the chart can be found (e.g., on page 2 of the FSP).

c. Write "no" in the Compliance column if the facility is not in compliance or is only in partial compliance.

7. If you have any questions as to whether an item is applicable, or if you are in compliance, contact your directorate assurance managers for information and/or clarification.

1.2 Institutionally Provided Services

Similar to the conduct of operations approach used by DOE, this document does not generally apply to services institutionally provided to a facility (such as utilities, security, etc.). There are, however, two items included in the DOE approach that are provided institutionally at LLNL. These two items are (1) the requirement for independent internal appraisals and (2) the requirement to maintain current or "as built" drawings for a facility. These items have not been included in the main body of the document because they are not generally the responsibility of facility personnel.

The Plant Engineering Department provides "as built" drawing services for facilities at LLNL. The responsibility for performing independent appraisals is the responsibility of Assurance Review Office, which reports to the Laboratory's Deputy Director for Operations. These items are identified here so that facility personnel will be aware of the requirements, even though they are institutional responsibilities.

2.0 Organization and Administration

2.1 Introduction

Facility management and program management operating within the facility are responsible for ensuring the safety of their respective operations and that an acceptable level of performance is achieved. To achieve this objective, it is important that organizational and individual responsibilities of facility managers, program leaders, and work supervisors be defined and documented. Facility managers are typically responsible for providing a facility that contains the elements necessary to safely achieve programmatic goals and should regularly observe programmatic activities in their facility to assure conformance to ES&H requirements; program leaders are typically responsible for the accomplishment of research and development efforts and establishing goals for safety and program performance; and work supervisors are typically responsible for directing day-to-day activities of workers and keeping management informed of operating problems and achievements. (The facility manager and program leader may or may not be the same person and may or may not be from the same directorate.) In addition, work supervisors should regularly observe activities in the workplace, provide constructive feedback on job performance, and analyze operating problems with the intent to minimize them.

2.2 Guidelines

The facility manager and/or program leaders (PL) are responsible for ensuring the following elements are provided, as appropriate:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. An organization chart and description of organizational responsibilities	**Yes**	**FM/PL**		
2. Facility management position descriptions	**Yes**	**FM**		
3. Provisions for adequate staffing levels	**Yes**	**FM/PL**		
4. Routine observation of work activities by supervision	**Yes**	**FM/PL**		
5. Trend analysis on ES&H and operating problems		**FM/PL**		
6. Safety, environmental, and program goals	**Yes**	**FM/PL**		
7. Personnel appraisals that include evaluation of adherence to ES&H and operating procedures	**Yes**	**FM/PL**		
8. Training for managers and supervisors	**Yes**	**FM/PL**		
9. Safety preplanning requirements for operations not authorized by existing safety plans	**Yes**	**FM/PL**		

2.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. An organization chart with description of organizational responsibilities

MHF/LHF—Organizational responsibilities should be defined for both programmatic and support organization personnel.

2. Facility management position descriptions

MHF/LHF—The individual responsible for implementing the ES&H controls in the FSP or OSP shall be identified.

3. Provisions for adequate staffing levels

MHF/LHF—Staffing levels shall be adequate to comply with the level of ES&H support specified in the FSP and applicable OSPs.

4. Monitoring of work activities by supervision

MHF/LHF—Work supervisors or their designees shall regularly observe important operational activities to identify and correct safety and operating deficiencies. (Reference: Document 2.1.)

5. Performance of trend analysis on ES&H and operating problems

MHF/LHF—Work supervisors should be aware of ES&H problems and attempt to minimize those that happen recurrently.

6. Safety, environmental, and program goals

MHF/LHF—Safety and environmental goals shall comply with any site-wide, goal-setting requirements. (Reference: Document 20.4, "LLNL Occupational Radiation Protection ALARA Program," in the *ES&H Manual.*)

7. Personnel appraisals that include evaluation of adherence to ES&H and operating procedures

MHF/LHF—Written performance appraisals shall be used to provide feedback to workers about their safety and job performance. Feedback on their performance should summarize contributions to the goals developed under Part 6 of this section, provide constructive comments on areas of deficiencies, and list steps necessary to improve performance. Performance appraisals should be provided at least annually. (Reference: Section E of *LLNL Personnel Policies and Procedures Manual*.)

8. Training for managers and supervisors

MHF—Managers and work supervisors should receive training in supervisory skills, ES&H issues specific to the facility, and facility operations in their area of responsibility. (Reference: Document 40.2, "Environment, Safety and Health Training and Education," in the *ES&H Manual*). Specific training requirements for nuclear facilities are contained in Document 50.1, "Personnel Selection, Qualification, Training, and Staffing at LLNL Nuclear Facilities," in the ES&H Manual.)

LHF—Work supervisors should receive training in supervisory skills, ES&H issues specific to the facility, and facility operations in their area of responsibility. (Reference: Document 40.1, "*LLNL Training Program Manual*," in the *ES&H Manual* and Document 40.2.) (Specific training requirements for nuclear facilities are contained in Document 50.1).

9. Safety preplanning requirements for operations not covered by existing safety plans

MHF, LHF—Operations not covered by existing safety plans (e.g., *ES&H Manual*, an FSP, or an OSP) shall comply with the preplanning requirements specified in Document 2.1.

3.0 Operating Practices and Safety Plans

3.1 Introduction

Facility management and/or program management are responsible for providing a safe work environment—i.e., ensuring that an adequate safety program exists, developing necessary ES&H plans, and ensuring that workers are properly trained regarding the identified hazards, associated controls, and operating plans. To do their jobs effectively, managers must be kept informed of current conditions in a facility or operation.

3.2 Guidelines

The facility manager and/or project leaders have the following responsibilities:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Instructing workers to notify managers and/or work supervisors of off-normal, unusual, and emergency events or of major changes in schedule	**Yes**	**FM/PL**		
2. Identifying responsible personnel	**Yes**	**FM/PL**		
3. Developing safety plans	**Yes**	**FM/PL**		
4. Ensuring that workers are trained to properly operate equipment and understand the OSP	**Yes**	**FM/PL**		

Each facility should have an ES&H program scaled to the operations within that facility. Currently, the Environmental Protection, Hazards Control, and Health Services Departments provide guidance and services in establishing and carrying out the ES&H program in each facility. The ES&H Team assigned to each facility provides an ES&H Team action plan, which is maintained in the ES&H Team leader's office and contains a detailed program for each of the guidelines listed below, as appropriate. (Each ES&H Team is comprised of a ES&H Team leader, ES&H specialists covering the full range of

hazards associated with the work in the facility, an environmental analyst, health services rep, and health and safety technologists.) The safety program shall contain the following elements, as appropriate:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
5. Industrial safety program	**Yes**	**FM**		
6. Health physics program		**FM**		
7. Industrial hygiene program	**Yes**	**FM**		
8. Criticality safety program		**FM**		
9. Fire safety program	**Yes**	**FM**		
10 Environmental protection program	**Yes**	**FM**		
11. ALARA program		**FM/PL**		

3.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Instructing workers to notify managers and/or work supervisors of off-normal, unusual, and emergency events or of major changes in schedules

MHF/LHF—Workers shall be instructed to promptly notify the facility manager/facility point-of-contact or program work supervisor (as appropriate) of abnormalities; off-normal, unusual or emergency events; changes in operational status; significant changes in schedules; and difficulties encountered in performing tasks.

2. Identification of responsible personnel

MHF—A facility or program person shall be identified for implementing the controls specified in the FSP and all other applicable Laboratory ES&H requirements. The responsible person may have an alternate and may reassign duties as he/she sees fit.

LHF—A facility or program person shall be identified for ensuring that operations are within the scope of *ES&H Manual* and evaluating whether an OSP or FSP is required. The responsible person may have an alternate and may reassign duties as he/she sees fit.

3. Developing safety plans

MHF/LHF—One of two safety plans are issued: FSPs, or OSPs. Facility Safety Plans (FSPs) are required for each hazard-ranked facility (i.e., non-general

industry) or group of facilities or when required by facility management. An FSP may limit or deny authorization for an activity that would otherwise be permissible. FSPs are prepared by facility management with input from organizations using the facility.

Operational Safety Plans (OSPs) are generally required for individual, limited-term activities unless the ES&H issues involved are associated with activities commonly performed by the public, are adequately described in an Integration Work Sheet, and are covered by the governing FSP. If the activity will take place in a facility covered by an FSP, then the OSP will either add to or limit the operations governed by that FSP. OSPs may be incorporated into FSPs when activities become long term with no anticipated changes in plans.

The format for safety plans is specified in Document 2.1 and Document 3.3, "Operational and Facility Safety Plans," in the *ES&H Manual*, and includes: (1) introduction, (2) work to be done (operations), (3) responsibilities, (4) training requirements, (5) hazards analysis and controls, (6) maintenance, inspections and quality assurance, (7) emergency response plans and procedures, and (8) authorizing signatures.

4. Ensuring that workers are trained to properly operate equipment and understand the safety plans

MHF/LHF—Work supervisors shall ensure workers know how to properly operate equipment, handle hazardous material, and recognize and respond to off-normal conditions (see Section 5 of this document). They shall also ensure workers understand (1) the inherent hazards of the material/ equipment they are working with and the appropriate controls thereof, and (2) that emergency response does not need supervisory approval, but that the supervisor shall be notified as soon as possible after the event (see Section 14 of this document). (References: Section 5 of this document, and Document 2.1, Document 40.2, and Document 22.1, "Emergency Management," in the *ES&H Manual*.

5. Industrial safety program

MHF/LHF—The industrial safety program shall include, as appropriate, (1) guidance for construction safety; (2) requirements for the use of head, eye, foot, and fall protection when working at heights; (3) plans for working with cryogens; (4) plans for entering or working in or around energized equipment or fixtures; (5) plans for working with explosives; (6) requirements for machine tool guarding; (7) guidance for earthquake safety; (8) plans for working with lasers, infrared, and ultraviolet (UV) radiation; (9) plans for using cranes and other material-handling devices; (10) plans for working with pressurized systems; and (11) plans for identifying safety hazards. (Reference: Documents 11.1, 11.2, 15.2, 16.1, 17.1, 18.1, 18.5, 22.4, 42.1 in the *ES&H Manual* and the Hazards Control Department industrial safety discipline action plan [DAP].)

6. Health physics program

MHF/LHF—The health physics program shall include, as appropriate, (1) requirements for the use of respiratory protection; (2) plans for working with radioactive materials and radiation sources; (3) plans for working with radiation-producing equipment; (4) plans for identifying workplace hazards; (5) plans for monitoring the workplace; and (6) plans for keeping radiation exposures ALARA (see item 11 below). (Reference: Document 20.1, "Occupational Radiation Protection," in the *ES&H Manual,* and the Hazards Control Department health physics DAP.)

7. Industrial hygiene program

MHF/LHF—The industrial hygiene program shall include, as appropriate, (1) requirements for the use of hearing and respiratory protection; (2) provisions for high-efficiency particulate air (HEPA) filter testing; (3) plans for working with chemicals; (4) plans for working with hazardous materials; (5) plans for working with microwaves, radio frequency, and, very low frequency (VLF) radiation; (6) plans for entering or working in confined spaces; (7) plans for working with biohazards; (8) plans for identifying workplace hazards; (9) plans for monitoring the workplace; and (10) a health hazard communication or chemical hygiene program. (Reference: Documents 11.1, 11.2, 12.2, 13.1, 14.1 in the *ES&H Manual,* and the Hazards Control Department industrial hygiene DAP.)

8. Criticality safety program

MHF/LHF—The criticality safety program should include, as appropriate, (1) limits on the mass of materials allowed in a workstation; (2) limits on the configuration of materials handled; (3) limits on the amount of moderating material permitted; (4) plans for identifying criticality hazards in the workplace; and (5) plans for monitoring the workplace. (Reference: Document 20.6, "Criticality Safety," in the *ES&H Manual,* and the Hazards Control Department criticality safety DAP.)

9. Fire safety program

MHF/LHF—The fire safety program shall include provisions for (1) minimizing the potential for the occurrence of a fire; (2) ensuring that fire does not cause an unacceptable on-site or off-site release of hazardous material that will threaten the public health and safety; (3) providing an acceptable degree of life safety to LLNL and contractor personnel and the public from fire in LLNL facilities; (4) ensuring that vital programs will not suffer unacceptable delays as a result of a fires; and (5) ensuring that property damage from fire does not exceed an acceptable level. (Reference: Document 22.5, "Fire," in the *ES&H Manual,* and the Hazards Control Department fire safety DAP.)

10. Environmental protection program

MHF/LHF—The environmental protection program shall include provisions for (1) identifying waste streams and minimizing hazardous, mixed, combined, and radioactive waste; (2) packaging hazardous, mixed, combined, and radioactive waste, spill protection and prevention plans, obtaining necessary permits, and National Environmental Policy Act (NEPA) compliance; and (3) monitoring effluents from the facility. NOTE: Although the Environmental Protection Department is distinct and separate from the Hazards Control Department, the environmental analyst functions as a member of the area ES&H Team.

11. ALARA program

MHF/LHF—The facility ALARA program shall include (1) establishment of ALARA goals for ionizing radiation if individuals in the facility are likely to receive 100 millirem/year to the whole body or 1 rem/year to the hands; and (2) programs or plans directed at minimizing personnel exposures to ALARA. (Reference: Document 20.4.)

4.0 Control Room Operations

4.1 Introduction

In some facilities, program and/or facility operations are directed and/or monitored from a central control room or control area. This arrangement is particularly common in large facilities where operations are relatively singular in nature (e.g., high-energy accelerators [such as the 100-MeV linear Accelerator], large laser facilities [such as National Ignition Facility], or the plutonium facility [where safety features such as the ventilation and alarm systems are monitored]). In some cases, a single facility may contain multiple control rooms for separate operations. It is important that (1) control rooms be identified and delineated; (2) access be limited so that operations are not hampered; and (3) only authorized personnel be permitted to operate the equipment in the control room.

4.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying and delineating control rooms		**FM/PL**		
2. Limiting access to the control room to authorized personnel		**FM/PL**		
3. Providing for prompt detection of, and response to, alarm conditions		**FM/PL**		
4. Specifying the personnel who are authorized to operate control room equipment		**FM/PL**		
5. Professional behavior in the control room		**FM**		

4.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying and delineating control rooms

MHF/LHF—Identify and physically delineate control rooms associated with systems, equipment, or processes where operator error at the control panel could result in the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

The following items in this section apply to these control rooms.

2. Limiting access to the control room to authorized personnel

MHF/LHF—When appropriate, the control room or control area should be posted to indicate that only authorized personnel are permitted entry. Access control may or may not be required when the facility or experiment is not operational. Unless otherwise specified in the FSP or OSP, people listed as "Responsible Individuals" in the applicable FSP or OSP (or their alternates or designees) may authorize access to the control room or control area.

3. Providing for prompt detection of, and response to, alarm conditions

MHF/LHF—Unless unattended operations are permitted, the control panel shall be monitored frequently during operations so that abnormal operating conditions can be detected promptly. During unattended operations,

important alarms (e.g., fire alarms, criticality alarms, or stack monitors) shall be monitored at a staffed remote location. All reasonable actions should be taken to correct the alarm cause and clear the alarm.

4. **Specifying personnel who are authorized to operate control room equipment**

   MHF/LHF – Plans and procedures (such as FSPs, OSPs, or operating procedures) shall clearly specify who is authorized to operate control room equipment.

5. **Professional behavior in the control room**

   MHF/LHF—Only activities related to the operation or specifically authorized by management shall be authorized in the control room when the equipment or system is being operated. Potentially distracting activities should be prohibited.

5.0 Communications

5.1 Introduction

The facility manager and/or program leaders are responsible for providing adequate communication capability in their facilities during routine and emergency conditions. Examples of communication systems include: telephones, public address systems, personnel beepers, radios, FAX machines, computer networks, megaphones, and audible and visual alarms. Workers in the facility should be instructed in the proper use of facility-specific communication devices.

5.2 Guidelines

Facility management and/or program management are responsible for providing a communication system(s) that:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Provides for easy communications within the facility and in the immediate area	**Yes**	**FM**		
2. Is capable of readily notifying workers of off-normal or emergency conditions	**Yes**	**FM**		

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
3. Allows for contacting workers who are outside the facility or "on call"		**FM/PL**		
4. Is reliable, usable in the local environment, and easily accessed and utilized by workers	**Yes**	**FM**		
5. Is available in out-of-the-way areas		**FM**		
6. Is regularly tested for functionality, if not used for routine communications	**Yes**	**FM**		
7. Is appropriately used by workers	**Yes**	**FM/PL**		

5.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Provides for easy communications within the facility and in the immediate area

MHF/LHF—Devices such as telephones or paging systems should be provided within a facility.

2. Is capable of readily notifying workers of off-normal or emergency conditions

MHF/LHF—Provisions shall exist for immediate notification of workers who may be in a hazardous area or environment. Notification systems may include a public address system, audible alarms, visual alarms, etc.

3. Allows for contacting workers who are outside the facility or "on call"

MHF/LHF—As appropriate, provisions should exist for locating key workers during off-hours, and during the workday while they are outside the facility. "Provisions" may consist of making home phone numbers available or wearing beepers when not near a listed phone number.

4. Is reliable, usable in the local environment, and easily accessed and used by workers

MHF/LHF—It is essential that telephones and safety alarms function during normal and off-normal conditions. Visual alarms shall be used in noisy area where audible alarms may go unnoticed. (Reference: Document 12.1, "Access Control, Safety Signs, Safety Interlocks, and Alarm Systems," in the *ES&H Manual*.)

5. Is available in out-of-the way areas

MHF—Communication systems shall be available in remote areas, such as basements, lofts, and equipment rooms, if work is conducted in those areas.

LHF—Communication systems are suggested, but not required, in remote areas, such as basements or lofts.

6. Is regularly tested for functionality, if not used for routine communications

MHF—Alarm and communication systems shall be regularly tested to assure functionality. The period between tests should be based on the likelihood of failure and the failure modes available. (Reference: Document 12.1.)

LHF—Alarms shall be regularly tested to assure functionality. The period between tests should be based on the likelihood of failure and the failure modes available. (Reference: Document 12.1.)

7. Is appropriately used by workers

MHF—Workers should be instructed as to the appropriate use of the communication systems, how to access facility specific communication devices, and how to announce emergency conditions. (Reference: Document 22.1.)

LHF—Workers should be instructed as to how to report emergency conditions. (Reference: Document 22.1.)

6.0 On-the-Job Training

6.1 Introduction

Workers who are new to an area may have a thorough technical background and a theoretical understanding of an operation, but may still require on-the-job training (OJT) to ensure they understand the specific details of an operation. For example, individuals operating an accelerator need to understand the detailed start-up procedure, just as workers changing a contaminated HEPA filter need to have hands-on (i.e., on-the-job) training before conducting this operation independently. Work conducted by personnel under instruction shall be carefully supervised to avoid errors that could have significant impact on safety or operations. OJT should be conducted so that the trainee satisfactorily completes all of the required training objectives and receives maximum learning benefit from this experience.

6.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying tasks requiring OJT		**FM/PL**		
2. Documenting OJT instructor qualifications		**FM/PL**		
3. Specifying how trainees may be used to support work activities		**FM/PL**		
4. Ensuring that trainees are aware of operating limits and hazards		**FM/PL**		
5. Ensuring the appropriate area supervisor has approved OJT		**FM/PL**		
6. Documenting OJT		**FM/PL**		
7. Limiting the trainee's role during abnormal conditions		**FM/PL**		

6.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying tasks requiring OJT

MHF/LHF—Identify operations or processes in the facility where misoperation or mishandling could result in the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

An OJT program should exist for these operations or processes and contain the elements listed below (items 2 through 7). If not specified elsewhere, OJT requirements shall be addressed in relevant FSPs or OSPs. (Reference: Document 40.1)

2. Documenting OJT instructor qualifications

MHF/LHF—Qualifications of the instructors and evaluators shall be documented. Instructors should be qualified in the area they are instructing, and may become qualified by education, training, or experience. The facility manager or program leader (as appropriate), or his/her designee, is responsible for determining the qualification process and who is qualified to be an instructor.

3. **Specifying how trainees may be used to support work activities**

   MHF/LHF—The constraints on trainees should be defined, as appropriate. Work supervisors of trainees shall ensure the trainees understand these constraints (e.g., the level of supervision required to conduct a certain task).

4. **Ensuring that trainees are aware of operating limits and hazards**

   MHF/LHF—Work supervisors of trainees shall ensure the trainees understand operating limits and the hazards associated with the task being conducted. For example, plutonium handler trainees shall understand the operating mass limits and controls established for criticality safety purposes and the potential consequences of disregarding these limits and controls.

5. **Ensuring the appropriate area supervisor has approved OJT**

   MHF/LHF—Training modules typically pertain to a specific topic or operation. If someone other than the cognizant supervisor is conducting the training, the supervisor responsible for that topic or operation should approve the training module to ensure it contains all the necessary elements and that critical details are not overlooked.

6. **Documenting OJT**

   MHF/LHF—Documentation requirements are specified in Document 40.1 and include the training plan (i.e., course objectives and outline) and auditable records of each individual's participation and performance in, or exception from, the OJT program. Retraining requirements, or the length of the qualification period, should also be specified. Supervisors shall have access to qualification (OJT) records, as necessary, to support the assignment of work to qualified individuals.

7. **Limiting the trainee's role during abnormal conditions**

   MHF/LHF—Depending on the type of training being conducted and the proficiency level of the trainee, acceptable responses to abnormal conditions will vary. Both the trainer and the trainee should understand their roles relative to operation of equipment or systems during abnormal conditions.

7.0 Investigation of Abnormal Events

7.1 Introduction

Facility management and/or program management are responsible for identifying abnormal events that require analysis. LLNL has an established procedure that defines those events to be analyzed, the format of the analysis report, and the procedure for follow-up on recommended corrective action.

7.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying events that require analysis	**Yes**	**FM/PL**		
2. Using Document 4.6, "Incident Analysis Manual," in the ES&H Manual **for investigating events that require analysis**	**Yes**	**FM/PL**		
3. Ensuring follow-up on corrective actions	**Yes**	**FM/PL**		
4. Initiating prompt response to incidents involving suspected sabotage	**Yes**	**FM/PL**		

7.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identification of events that require analysis

MHF/LHF—Managers and supervisors are responsible for identifying those events that require analysis and reporting them to their AD, through their line management chain, and to the Directorate's assurance manager, or their designees. Detailed information on identifying abnormal events and compliance with this guideline can be obtained by attending LLNL's emergency preparedness course (EM2010). (Reference: Document 4.6, and Document 4.3, "Occurrence Reporting and Processing of Operations Information—LLNL Implementing Procedures for DOE O 232.1A," in the *ES&H Manual*.)

2. Using Document 4.6, "Incident Analysis Manual," to investigate events that require analysis

MHF/LHF—Document, 4.6, "Incident Analysis Manual," contains information on the following: identification of the person responsible for initiating the analysis; appointment of an analysis committee; qualifications of analysis committee members; specification of information to be gathered; guidelines for conduct of the analysis; specification of the analysis report format; and specification of the analysis report time frame.

3. Ensuring follow-up on corrective actions

MHF/LHF—The appropriate managers should monitor progress on corrective actions until they are completed.

4. Notifying security in cases of suspected sabotage

MHF/LHF—Acts of known or suspected sabotage are a special case of event investigations. If an act of sabotage is discovered or suspected, it is important to begin an investigation immediately and to accomplish the following:

- Determine the condition of the affected system(s) and ensure the operability of all safety-related systems.
- Decide if continued operation is justified or if systems are available to support safe facility shutdown.
- Minimize the impact of discovered acts of sabotage and deter future acts of sabotage.

8.0 Notifications

8.1 Introduction

Facility management and/or program management are responsible for the timely notification of their line management and assurance manager of events that could affect the health and safety of the public or endanger the health and safety of workers. Line management is then responsible for notification of appropriate DOE personnel and other agencies of these events. NOTE: Classified information is not to be disseminated as part of these notifications. LLNL has established a procedure that ensures the uniformity, efficiency, and thoroughness of such notifications (see Document 4.3).

8.2 Guidelines

Facility management and program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identification of events and conditions that require notification	**Yes**	**FM/PL**		
2. Understanding their responsibilities relative to notification procedures and documentation	**Yes**	**FM/PL**		
3. Notifying the appropriate assurance manager of the event or condition	**Yes**	**FM/PL**		

8.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identification of events and conditions that require notification

MHF/LHF—Facility management, program management, and work supervisors should be trained in what constitutes reportable occurrences. Compliance with this guideline can be obtained by attending LLNL's emergency preparedness course (EM2010). (Reference: Document 4.3.)

2. Understanding their responsibilities relative to notification procedures and documentation

MHF/LHF—Facility management and/or program management and work supervisors shall understand their responsibilities relative to the notification process, including (1) the responsibility for notifying their line management and assurance manager; (2) the type of data required; (3) reporting deadline requirements; and (4) record keeping. The LLNL class providing this information is course EM2010, "Occurrence Reporting." (Reference: Document 4.3

3. Notifying the appropriate assurance manager of the event or condition

MHF/LHF—The assurance manager is separate from line management and should be informed of any events requiring notification.

9.0 Controlling the Status of Equipment and Systems

9.1 Introduction

The status of equipment and systems important to safety or operations should be controlled so operations proceed according to specifications. Controls should exist for installation, modification, maintenance, and post-maintenance checkout of important equipment and systems. Also, it is important that current information regarding the status of equipment and systems be made available to personnel needing it to perform their work assignments properly.

9.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying equipment and/or systems that need controlling		**FM/PL**		
2. Establishing and implementing controls for the following:				
a. Authorizing modifications		**FM/PL**		
b. Informing necessary personnel of status changes		**FM/PL**		
c. Ensuring that equipment is installed properly before operation		**FM/PL**		
d. Lockout and tag procedures		**FM/PL**		
e. Ensuring compliance with operating limits		**FM/PL**		
f. Identifying and reporting equipment deficiencies		**FM/PL**		
g. Post-maintenance testing procedures		**FM/PL**		
h. Ensuring there is a clear indication of alarm status		**FM/PL**		
i. Installing temporary modifications or bypasses		**FM/PL**		

9.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying equipment and/or systems that needs controlling

MHF/LHF—Identify equipment and/or systems whose misoperation, failure, or faulty installation, maintenance, or modification could result in the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

The guidelines specified in item 2 (below) apply to these systems or pieces of equipment.

2. Establishing and implementing controls for the following:

a. Authorizing modifications

MHF/LHF—A formal mechanism shall be established to authorize changes in configuration or status.

b. Informing necessary personnel of status changes

MHF/LHF—A formal mechanism shall be established to ensure personnel are kept informed of any changes in the operational status of the equipment or systems.

c. Ensuring that equipment is installed properly before operation

MHF/LHF—Prior to placing equipment or systems in operation for the first time, a management prestart review shall be conducted to assure the hardware is capable of performing its intended function and that procedures are developed and approved. For major systems or pieces of equipment, an operational readiness review (ORR) or readiness assessment may be required. (Reference: Document 51.4, "Startup and Restart of Nuclear Facilities," in the *ES&H Manual*) Direction and guidance for a management prestart review is discussed in Document 2.2, "Managing ES&H for LLNL Work" in the *ES&H Manual*.

d. Lockout and tag procedures

MHF/LHF—All facilities shall comply with the lockout and tag procedures detailed in Document 12.6, "LLNL Lockout/Tagout Program," in the *ES&H Manual*.

e. Ensuring compliance with operating limits

MHF/LHF—Individuals who are responsible for conducting operations in a facility need to be informed of any operating limits. Documentation in logs, status sheets, checklists, or other appropriate documentation should be maintained to indicate compliance with proper operating limits. For example, magnehelic gauges that measure the pressure drop across HEPA filters should be read and their status documented regularly.

f. Identifying and reporting equipment deficiencies

MHF/LHF—Equipment deficiencies noted by workers should be immediately reported to the cognizant supervisor. Deficiencies should be communicated to personnel who are responsible for operating and repairing the equipment. *Hazardous and concealed dangers shall be immediately identified and/or fixed in accordance with the California Criminal Liability Act (January 1991).*

g. Post-maintenance testing procedures

MHF/LHF—Equipment shall (MHF) and should (LHF) be tested following maintenance to demonstrate that it is capable of performing its intended function. The testing should include all performance functions that may have been affected by the maintenance.

h. Ensuring there is a clear indication of alarm status

MHF/LHF—The status of alarms shall be available to operations and maintenance personnel. Information shall include alarms that are disabled, whose setpoints have been temporarily changed, or that are lit during normal operation.

i. Installing temporary modifications or bypasses

MHF/LHF—Administrative procedures shall be established for the installation of temporary modifications, such as electrical jumpers, bypassed interlocks, temporary set-point changes, or disabled annunciators. The procedures shall include authorization required to perform the temporary modification, documentation indicating the nature of the temporary modification, a specified length of time that the bypass is to be in effect, and documentation as to when the temporary modification has been removed. (Reference: Document 12.1 and Document 20.3, "LLNL Radiological Safety Program for Radiation-Generating Devices," in the *ES&H Manual*.)

10.0 Lockouts and Tags

10.1 Introduction

Lockout and tag is a proven process for ensuring that workers do not cause harm (e.g., shock) to themselves or others when working on or around equipment capable of causing such harm. It is imperative that individuals working on or around potential stored energy sources observe LLNL's lockout and tag policies and procedures.

10.2 Guidelines

Facility management and/or program management are responsible for ensuring the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Work supervisors instruct employees to implement LLNL's lockout and tag policies and procedures	**Yes**	**FM/PL**		
2. When appropriate, lockout and tag requirements are incorporated into (or referenced in) FSPs, OSPs, or other operating procedures	**Yes**	**FM/PL**		

10.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Supervisors instruct workers to implement LLNL's lockout and tag and procedures

MHF/LHF—Work supervisors of LLNL and subcontract workers shall satisfy LLNL's lockout and tag requirements and implement lockout and tag procedures when workers are engaged in erecting, installing, constructing, repairing, adjusting, inspecting, operating, or maintaining equipment that is capable of causing personal harm, property damage, or significant work shutdown from an energy source. LLNL's lockout and tag requirements and procedures are contained in Document 12.6, which includes the following elements: (1) implementation of lockout and tag procedures; (2) standardization of protective materials and hardware; (3) establishment of a lockout and tag program; (4) procedures for lockout and tag; (5) application of lockout and tag; (6) testing on positioning of equipment or components; (7) conduct and documentation of periodic inspections; (8) standardization of warning tags/signs; (9) notification, training, and communication of lockout/tag procedures; (10) subcontractor interface on lockout/tag procedures; (11) procedures for group lockout and tag; (12) procedures for shift or personnel change; and (13) removal of lockout and tag devices.

2. When appropriate, lockout and tag requirements are incorporated into (or referenced in) FSPs, OSPs, or operating procedures

MHF/LHF—Workers who routinely work on or around potentially energized systems tend to be very familiar with the lockout and tag procedure. Facility management and program management may wish to emphasize this procedure in appropriate FSPs, OSPs, IWS, or other operating instructions when the target audience consists of workers who do not routinely work on systems with stored electrical or mechanical energy.

11.0 Independent Verification

11.1 Introduction

Independent verification is the act of checking to ensure that essential valves, switches, circuit breakers, etc., are properly positioned, and recognizes the human element of component operation; that is, that any worker, no matter how proficient, can make a mistake and misposition valves, switches, circuit breakers, etc. This section defines when independent verification is required, identify which components must be included in the independent verification program, and prescribe methods for performing independent verification.

11.2 Guidelines:

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying equipment or systems that require independent verification		**FM/PL**		
2. Ensuring that correct component positioning is indicated on meter readouts or contained in written procedures		**FM/PL**		
3. Ensuring that independent verification is conducted and documented		**FM/PL**		

11.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying equipment or systems that require independent verification

MHF/LHF—Identify equipment and/or systems with manually operated valves, switches, circuit breakers, etc., that do not have alarms or other means of detecting improper positioning and whose improper positioning could result in the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

Subsequent items in this section pertain to equipment and/or systems meeting these criteria.

2. Ensuring that correct component positioning is indicated on meter readouts or contained in written procedures

MHF/LHF—Meters or switches shall be positively identified as to acceptable positioning or specific written documentation indicating acceptable positioning shall exist and be available to the individual conducting independent verification.

3. Ensuring that independent verification is conducted and documented

MHF/LHF—Independent verification should be conducted and documented, as appropriate (preferably by an individual not involved in the reinstallation, bypass, or maintenance operation), after the equipment or system has been returned to service following maintenance, put in a bypass mode, or tested for proper functioning. Periodic independent verification checks should also be performed during normal facility operations. Individuals conducting independent verification shall be knowledgeable of the equipment or system, or be trained or instructed as to proper operation and positioning.

12.0 Recordkeeping

12.1 Introduction

Formal records or logbooks should be maintained in facilities for those operations that can have significant impact to health, safety, or the environment, or significant impact to programs. These records should contain enough information so they can be used to track the history of various situations or pieces of equipment, or to document occurrences within the facility.

12.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying operations, areas, or equipment where formal recordkeeping is required, and assigning logbook-keeping responsibilities		**FM/PL**		
2. Specifying the type of information to be entered in the logbook		**FM/PL**		
3. Ensuring information is added in a timely manner		**FM/PL**		
4. Specifying a method for correcting erroneous entries		**FM/PL**		
5. Directing logbook entries to be made in a legible and easily understood manner		**FM/PL**		
6. Regularly reviewing the logbook for conformance with logbook-keeping requirements		**FM/PL**		
7. Maintaining logbooks in a retrievable manner		**FM/PL**		

12.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying operations, areas, or equipment where formal recordkeeping is required, and assigning logbook-keeping responsibilities

MHF/LHF—Logbooks should be maintained for work areas, equipment, or for programmatic support activities associated with operations, equipment, or processes that could produce the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

The following items in this section pertain to these logbooks.

2. **Specifying the type of information to be entered in the logbook**

   MHF/LHF—As appropriate, information entered in operating logbooks should include the following:

   - Abnormal equipment configurations.
   - Significant changes in equipment status.
   - Occurrence of abnormal events.
   - Completion status of assigned work, including established routine surveillance.
   - Changes in assigned workers.
   - Equipment alarms.
   - Date and identification of the person making the logbook entry.
   - Maintenance or repair activities.
   - Facility mode or condition changes.

3. **Ensuring information is added in a timely manner**

   MHF/LHF—Logbook entries should be made in a timely fashion so pertinent information is not forgotten and the logbook is kept current.

4. **Specifying a method for correcting erroneous entries**

   MHF/LHF—Errors made in operating logbook entries should not be erased or covered up. Errors should be crossed out with thin lines that do not obscure the original entries. If this is not possible, there should be a written indication of where the corrected entries can be located. Error deletions and entry corrections should be initialed and dated.

5. **Directing logbook entries to be made in a legible and easily understood manner**

   MHF/LHF—Operating logbook entries should be legible and easily understandable. If possible, entries should be made in chronological order and include the time, date, and initials of personnel making entries. Logbook entries relating to off-normal and emergency conditions should contain enough information to allow reconstruction of events at a later date. Workers should be instructed that maintaining control over equipment and operating conditions should take precedence over making logbook entries.

6. **Regularly reviewing the logbook for conformance with logbook-keeping requirements**

   MHF/LHF—Work supervisors directly responsible for work areas should regularly review logbooks in their areas for conformance with logbook-keeping requirements and to spot trends that may indicate degrading operations so that corrective action can be taken before an emergency occurs.

7. Maintaining logbooks in a retrievable manner

MHF/LHF—Logbooks shall be protected from fire, water, or other types of damage. Completed logbooks shall be retained in a retrievable manner for time periods specified by the facility manager or program leader.

13.0 Shift Turnover

13.1 Introduction

Shift personnel should be aware of the current conditions in a facility so that they can perform their duties in a safe manner. Therefore, it is important that workers report changes and other relevant information that occurs during their shift to personnel on subsequent shifts.

13.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying personnel (by position), equipment, and operations that require a shift-turnover procedure		**FM/PL**		
2. Ensuring that a shift-turnover checklist exists		**FM/PL**		
3. Specifying and documenting shift-turnover responsibilities		**FM/PL**		

13.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying personnel (by position), equipment, and operations that require a shift turnover procedure

a. MHF/LHF—Formal shift turnovers shall be required for shift operations associated with operations, processes, or equipment that could produce the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

b. MHF/LHF—Formal shift turnovers should be required for shift operations not associated with operations, processes, or equipment in Section 12.III.1.a.

The facility manager and/or program leaders should allow for overlapping shifts, as appropriate, to provide for adequate information exchange between workers on different shifts. Subsequent items in these sections pertain only to these shift turnover activities.

2. Ensuring that a shift turnover checklist exists

MHF/LHF—A checklist should be prepared, used, and kept in a designated place.

3. Specifying and documenting shift turnover responsibilities

MHF/LHF—Shift personnel should read the operations log or other applicable documents before assuming responsibility. A description of the turnover process, including personnel responsibilities, should be documented. Work supervisors should brief shift personnel as required.

14.0 Indirect Monitoring of Operating Parameters

14.1 Introduction

In most cases, the important operating parameters of a facility or an experimental setup are monitored continuously and directly via gauges, meters, or other instrumentation. This section applies to those parameters that cannot be monitored directly and for which samples must be taken and analyzed to determine their status. The facility manager and/or program leaders are responsible for the identification and monitoring of those operating parameters that, if out of normal range, could significantly impact health, safety, or the environment. An example of such an analysis is the testing of a potentially contaminated facility cooling system to ensure it does not cross-contaminate other facility equipment or LLNL's positively pressurized water (PPW) supply. This section does *not* apply to institutionally required sampling and analyses, such as testing of drinking water supplies, sewer monitoring, environmental sample analyses, or waste analyses.

14.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying the systems and/or equipment requiring sampling and analysis and the analyses to be performed, and defining the range of acceptable results		**FM/PL**		
2. Ensuring that workers involved in sampling and analysis understand their responsibilities		**FM/PL**		
3. Ensuring that workers have the necessary training and equipment to carry out their specified tasks		**FM/PL**		
4. Responding to out-of-range results		**FM/PL**		

14.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying the samples requiring analysis and analysis to be performed, and defining the range of acceptable results

MHF/LHF—Sampling and analyses should be conducted to identify conditions or materials that could significantly impact health, safety, the environment, or plant operations. The type of analysis to be performed and the range of "normal" results should also be specified for these samples. For example, analyses should be required for a facility cooling system that could cross-contaminate LLNL's PPW system or other facility equipment or systems. Examples of items that are excluded from this requirement include research chemistry, bioassay sample analysis, facility swipe analysis, and institutionally required chemical analyses. Subsequent items in this section apply to samples that require monitoring.

2. Ensuring that workers involved in sampling and analysis understand their responsibilities

MHF/LHF—Responsibilities to be specified should include, but not be limited to (1) how to take a sample; (2) who is responsible for sample collection; (3) what is the sampling frequency; (4) which analyses are required; (5) who is to

review data; (6) how data are to be reported; and (7) what is the response to out-of-range results. Typically, these issues are resolved by the facility manager, the program leader, and the area ES&H Team leader.

3. Ensuring workers have the necessary equipment to carry out their specified tasks

MHF/LHF—Individuals responsible for sampling, conducting analyses, and reviewing data will typically come from a variety of organizations not under the facility manager or program leader' s control (e.g., Environmental Protection Department, Chemistry and Materials Sciences Department, and/or Hazards Control Department). Discipline (payroll) managers—as opposed to facility managers or program leaders—are responsible for ensuring their workers have the knowledge and training necessary for carrying out the requisite tasks. Facility managers and/or program leaders are responsible for ensuring that workers have the necessary equipment to carry out their responsibilities.

4. Responding to out-of-range results

MHF/LHF—The individual(s) conducting the sampling and analysis (typically the area ES&H Team environmental analyst, industrial hygienist, or health physicist) shall notify the facility managers and/or program leaders of out-of-range results and will also supply recommendations for dealing with the situation. Facility managers and/or program leaders are ultimately responsible for the response to out-of-range results, which may include—but is not limited to—the following: identifying the cause; interpreting the results; taking steps to correct the problem; shutdown of equipment; follow-up actions; and reporting to higher level management.

15.0 Required Reading

15.1 Introduction

LLNL's safety policies and procedures are documented in a variety of manuals, including, but not limited to, the *ES&H Manual*, FSPs, DAPs, safety analysis reports and documents (SARs and SADs), operational safety requirements (OSRs), technical safety requirements (TSRs), and OSPs. Workers need to be familiar with the details in many of these documents.

15.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Determining which documents are to be included in each facility's required reading program		**FM/PL**		
2. Preparing a list of documents to be included in the required reading program		**FM/PL**		
3. Ensuring that the documents included in the required reading program are available in the facility		**FM/PL**		
4. Regularly reviewing and updating the required reading list		**FM/PL**		
5. Providing a system for documenting that workers have completed the required reading		**FM/PL**		

15.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Determining which documents are to be included in each facility's required reading program

MHF/LHF—Workers shall read documents that pertain specifically to their operation. Examples of required reading may include the applicable parts of the *ES&H Manual*, FSP, OSP, and applicable material safety data sheets (MSDSs). Work supervisors or program leaders should have a more global understanding of the facility and operations and may have SARs, or SADs, included on their list of required reading.

2. Preparing a list of documents to be included in the required reading program

MHF/LHF—The required reading list shall be documented and publicized. Required reading may be included in the facility or program training plans.

3. Ensuring that the documents included in the required reading program are available in the facility

MHF/LHF—Required reading documents should be available in the facility or in the program area.

4. **Regularly reviewing and updating the required reading list**

   MHF/LHF—The required reading list should be regularly updated and approved by the person (by position) generating the list.

5. **Providing a system for documenting that workers have completed the required reading**

   MHF/LHF—Documentation should be provided to show that workers have completed the required reading on their list.

16.0 Instructions to Workers

16.1 Introduction

Information or instructions that are important to health, safety, or the environment, or that could have significant impact on programs, shall be accurately communicated to workers. Additionally, because LLNL operates with a matrix-management system, instructions or requests for support often are directed to workers outside the immediate facility or program. Therefore, it is important that effective means exist for providing instructions to workers within facilities and programs and across the support organizations that comprise LLNL.

16.2 Guidelines

Facility management and/or program management should ensure there is a mechanism for implementing the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying special short- and long-term instructions to workers		**FM/PL**		
2. Contacting and making requests of support organizations		**FM/PL**		
3. Adequately posting areas containing a potential safety hazard		**FM/PL**		

16.3 Guidance For Implementing or Evaluating Compliance with Specific Guidelines:

1. Identifying special short- and long-term instructions to workers

MHF/LHF—Special short- and long-term instructions that, if misunderstood, could result in the following conditions shall be accurately communicated to workers:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

"Special instructions" are typically supplemental to normal operating procedures and issued in response to a changing condition. As appropriate, long-term instructions should be incorporated into the procedure during the review cycle following their issuance. The facility manager and/or the program leaders should provide a means of communicating these instructions to workers. Logs or daily orders books are examples of mechanisms that can be effectively used for this purpose.

2. Contacting and making requests of support organizations

MHF/LHF—Work supervisors should be informed as to how to contact support organizations relevant to their operation. Support organizations include, but are not limited to, Hazards Control Department, Health Services Department, the Environmental Protection Department, Plant Engineering, Mechanical Engineering, and Safeguards and Security.

3. Adequately posting areas containing a potential safety hazard

MHF/LHF—Work supervisors shall ensure that areas with special requirements or those containing safety hazards are appropriately posted. For example, a room where an incident has just occurred needs to be undisturbed until the investigation is complete. Such an area should be secured or roped off and posted with a "Do Not Enter" sign containing the name and phone number of a contact person. Workers are instructed in course HS0001 (New Employee Safety Orientation) to observe all such signs posted in an area.

17.0 Equipment Operating Procedures

17.1 Introduction

Operating procedures are written instructions that give workers directions on how to conduct specific operations or operate specific systems or pieces of equipment during

normal, postulated off-normal, and emergency conditions. Such procedures should be written for operations that could significantly impact health, safety, the environment, or the program. Guidelines in this document apply to equipment operating procedures, which are a specific type of work procedure. Document 3.4, "Preparation of Work Procedures," in the *ES&H Manual* addresses additional Laboratory requirements for work procedures and provides guidance about their contents and format.

17.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying equipment that requires operating procedures		**FM/PL**		
2. Ensuring that the content of operating procedures conforms to prescribed guidelines		**FM/PL**		
3. Specifying a formalized method for initiating temporary and permanent changes to operating procedures		**FM/PL**		
4. Reviewing and documenting approval of operating procedures		**FM/PL**		
5. Ensuring that new operating procedures and those undergoing major revision are operationally tested prior to final approval and use		**FM/PL**		
6. Reviewing operating procedures to ensure they are kept current		**FM/PL**		
7. Ensuring that work supervisors maintain a copy of applicable operating procedures in work areas for worker reference		**FM/PL**		

17.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying equipment that requires operating procedures

MHF/LHF—Identify equipment and/or systems which require a specific sequence of operation and whose misoperation could result in the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

Operating procedures should be written for this equipment and these systems. The following items in this section pertain to these required procedures: Operating procedures are detailed instructions for operating a system or piece of equipment (e.g., they are step-by-step and require verbatim compliance). They are *not* OSPs, but may be contained in an OSP or FSP by means of an appendix. (Reference: Document 3.4.)

2. Ensuring that the content of operating procedures conforms to prescribed guidelines

MHF/LHF—Operating procedures for normal, off-normal, and emergency conditions may be combined in one or prepared in separate procedures. Procedures for systems or processes that contain several major components may be prepared in sections that correspond to individual components. Procedures do not have to completely describe individual operating systems or processes, but they shall be comprehensive enough to allow workers to perform required work without supervision. Each operating procedure should contain the following sections, as appropriate:

a. Purpose—an explanation of why the procedure has been prepared.
b. Description of equipment—a brief description of the equipment or system and its location.
c. Definitions (as applicable).
d. Safety considerations—a list of applicable safety or operating limits, cautions, and warnings.
e. Prerequisites (as applicable)—a list of tools, instrumentation, training, etc., needed to begin work.
f. Responsibilities—a list of job titles for the work supervisor and an alternate responsible for the work.
g. Operating instructions—the operating steps should be arranged in the normal or expected operating sequence. If appropriate, notes of caution or warning shall precede the step they apply to. If instructions covering emergency conditions are included in this section, they shall be clearly labeled as "emergency instructions."

h. References (if applicable).
i. Figures and tables (if applicable)—include a list of figures and tables in the order they are mentioned in the operating instructions.
j. Individual sign-offs should be provided for selected critical steps, as appropriate.

3. Specifying a method for initiating temporary and permanent changes to operating procedures

MHF/LHF—During periodic reviews of operating procedures, changes shall be made if inadequacies or errors are found. When work is being conducted, on-the-spot changes can be made if approved by the lead worker and the supervisor of the work activity. Information about on-the-spot changes shall be documented. Management approving the original procedure shall be promptly notified in writing about the content and reason for the on-the-spot change. Distribution copies of operating procedures shall be updated if on-the-spot changes are made to the original procedures. Work supervisors and workers should take necessary actions during emergencies to protect personnel, equipment, and the public without initiating the formal procedure change process.

4. Reviewing and documenting approval of operating procedures

MHF/LHF—Operating procedures shall receive initial and at least annual (±2 months) management review for correctness. Management approval shall not be given until review comments have been resolved. In addition, the supervision for the work activity, area ES&H Team leader, and management responsible for the work activity shall review new and significantly revised procedures. Any of these reviewers may request additional interdisciplinary reviews. A signature page shall be attached to distribution copies and should contain dated signatures of managers approving the procedure.

5. Ensuring that new operating procedures and those undergoing major revision are operationally tested prior to final approval and use

MHF/LHF—New operating procedures and those receiving major revision shall be verified for correctness prior to management approval. As appropriate, procedures should be verified after occurrences such as accidents, equipment malfunctions, and worker operating errors.

6. Reviewing operating procedures to ensure they are kept current

MHF/LHF—Provisions shall be made for ensuring official copies of operating procedures are kept current. They shall be reviewed and updated at least annually.

7. Ensuring that work supervisors maintain a copy of applicable operating procedures in work areas for worker reference

MHF/LHF—Operating procedures shall be available in the work area for use and reference by workers. Workers shall be instructed in the use of operating procedures. Procedures shall include instructions that can be used as references on how to conduct infrequently performed activities and respond to off-normal conditions. Workers shall be knowledgeable enough with emergency procedures to take immediate action without first consulting the emergency procedures.

18.0 Operator-Aid Postings

18.1 Introduction

"Operator aids" are technical postings, other than formal procedures, rules, instructions, etc., that assist workers in accomplishing specific tasks and are not required to be posted or displayed by any organization or procedure. Examples of operator aids include a temperature curve for an induction furnace; a calibration curve for a radiation detector; and a schematic of the electrical distribution system for a glovebox. Examples of required postings (those are *not* operator aids) include radiation area signs, material balance sheets, and evacuation assembly point postings. Operator aids provide an important function in the safe operation of a facility; therefore, it is important that these postings reflect the most current information available and do not conflict with any other controlled procedure or information.

18.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying operator aids that must be controlled		**FM/PL**		
2. Identifying an individual for approving operator aids		**FM/PL**		
3. Ensuring that operator aids are regularly reviewed to verify they are current and appropriate		**FM/PL**		

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
4. Ensuring that operator aids are posted so that they do not obscure or interfere with instruments or controls		**FM/PL**		
5. Ensuring that operator aids are legible and posted as close as practicable to the system or equipment with which they are associated		**FM/PL**		

18.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying operator aids that must be controlled

MHF/LHF—Identify operator aids whose accuracy is critical to operating a system or piece of equipment so that it does not produce the following:

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

A listing of the identified operator aids shall be maintained by the facility.

Subsequent items in this section apply to these operator aids only.

2. Identifying an individual responsible for approving operator aids

MHF/LHF—Management shall (MHF/nuclear facilities) and should (LHF) designate a person responsible for approving the posting of operator aids. The designated individual should be knowledgeable about the system and should be responsible for subsequent items in this section.

3. Ensuring that operator aids are regularly reviewed to verify they are current and appropriate

MHF/LHF—Operator aids shall (MHF/nuclear facilities) and should (LHF) be reviewed annually to verify that they are current and appropriate and that items posted during the year are identified as operator aids, if appropriate.

4. Ensuring that operator aids are posted so that they do not obscure or interfere with instruments or controls

MHF/LHF—Posted information *shall not* obscure or interfere with proper operation of instruments, equipment, or controls.

5. Ensuring that operator aids are legible and posted as close as practicable to the system or equipment they are associated with

MHF/LHF—Operator aids in the form of signs should be legible and posted unambiguously, so it is clear and obvious what they refer to. Consideration should be given to "formalizing" operator aids—i.e., having permanent signs made up or laminating paper signs. Signs that are illegible or confusing should be removed.

19.0 Equipment and Piping Labeling

19.1 Introduction

It is important that equipment and piping be consistently labeled in LLNL facilities, so maintenance and modifications can be safely conducted.

19.2 Guidelines

Facility management and/or program management are responsible for the following:

	Applicable (Yes/No)	Responsibility for Compliance (FM/PL)	Compliance (Yes/No)	Comment and/or reference for verification of compliance
1. Identifying equipment and piping that must be labeled in accordance with this program		**FM/PL**		
2. Using Plant Engineering standards for label requirements, label placement, and abbreviations		**FM/PL**		
3. Ensuring that workers are trained or instructed before performing maintenance on labeled equipment		**FM/PL**		
4. Maintaining a list of equipment and piping that require labeling		**FM/PL**		

19.3 Guidance for Implementing or Evaluating Compliance with Specific Guidelines

1. Identifying equipment and piping that must be labeled in accordance with this program

MHF/LHF—Facility and programmatic equipment and piping associated with operations, processes, or equipment that could produce the following shall be labeled in accordance with the Plant Engineering Standards PEL-M-11009, Rev. A (for equipment) and PEL-M-1.02, Rev. C (for piping and valve identification):

- Significant impact to health, safety, or the environment; or
- Significant impact to programs.

Examples of components requiring labeling are valves; major equipment (e.g., tanks, pumps, and compressors); switches; circuit breakers; fuse blocks or fuse locations; instruments and gauges; buses and motor control centers; emergency equipment; and fire protection systems. Assistance and guidance on facility equipment and piping labeling can be obtained from Plant Engineering. Subsequent items in this section apply to the systems and equipment identified above.

2. Using Plant Engineering standards for label requirements, label placement, and abbreviations

MHF/LHF—Follow the guidelines for label requirements, label placement, and abbreviations described in Plant Engineering Standards PEL-M-11009 (Rev. A) and PEL-M-1.02 (Rev. C).

3. Ensuring workers are trained or instructed before performing maintenance on labeled equipment

MHF/LHF—Workers operating or performing maintenance on a system that requires labeling shall recognize the significance of the labeling, and perform their work accordingly. Individuals needing assistance can reference Plant Engineering Standards PEL-M-11009 (Rev. A) and PEL-M-1.02 (Rev. C) or call Plant Engineering for assistance.

4. Maintaining a listing of equipment and piping that requires labeling

MHF/LHF—A list of equipment and piping requiring labeling should be maintained.

20.0 Work Standards

20.1 Work Smart Standards

DOE O 5480.19, Chg 1, "Conduct of Operations for DOE Facilities," Paragraphs 4 and 5.

DOE Order 232.1A, "Occurrence Reporting and Processing of Operations Information."

20.2 Other Sources

Plant Engineering Standard PEL-M-11009, Rev. A.

Plant Engineering Standard PEL-M-1.02, Rev. C.

Appendix A

Definitions

Abnormal	(For use in this Supplement): An unplanned event that is off-normal or unusual or an emergency, as defined in Document 4.3.
Facility-specific sampling	Liquid, solid, or gaseous samples taken within a facility for the purpose of identifying contaminants or concentration levels. The type of samples taken and the type of analyses conducted reflect the specific operations that take place in the facility.
Guidelines	(For use in this Supplement): The elements within this conduct of operations document that must be addressed by the appropriate management. These elements may be applicable or not to all situations; those requirements that are applicable become requirements and shall be implemented. If a deviation from a requirement is to be permitted, refer to Document 2.3, LLNL Exemption Process," in the *ES&H Manual.*
High-hazard facility (HHF)	A facility with the potential for on-site and off-site impact to large numbers of persons or for major impact to the environment. For the purpose of conduct of operations, this includes category 1 nuclear facilities(Reference: the *ES&H Manual* "Safety Analysis Program" (HSM S-6.06 link). At this time, LLNL does not have any high-hazard nor category 1 nuclear facilities. As a result, this term is not used elsewhere in this document. The definition is retained here in the event that it is needed in the future.
Low-hazard facility (LHF)	A facility that presents minor on-site and negligible off-site impacts to people or the environment. For the purpose of conduct of operations, this includes category 3 nuclear and radiological facilities(Reference: Document 3.1, "Safety Analysis Program," in the *ES&H Manual*.

Moderate-hazard facility (MHF)	A facility that presents considerable on-site impacts to people or the environment, but at most, only minor off-site impacts. For the purpose of conduct of operations, this includes category 2 nuclear facilities (Reference: Document 3.1.

Appendix B

Acronyms

AD	Associate director
ALARA	As low as reasonably achievable
DAP	Discipline action plan
DOE	U.S. Department of Energy
ES&H	Environment, safety, and health
FSP	Facility Safety Plan
HEPA	High-efficiency particulate air (filter)
HHF	High-hazard facility
LCW	Low-conductivity water
LHF	Low-hazard facility
MHF	Moderate-hazard facility
MSDS	Material safety data sheet
NEPA	National Environmental Policy Act
OJT	On-the-job training
ORR	Operational readiness review
OSP	Operational Safety Plan
OSR	Operational Safety Requirement
PPW	Positively pressurized water
SAD	Safety analysis document
SAR	Safety Analysis Report
UV	Ultraviolet
VLF	Very low frequency